Division of Agricultural Sciences

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PRICING CLING PEACH ORCHARDS

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CALIFORNIA AGRICULTURAL EXPERIMENT STATION
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by

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I. INTRODUCTION

One of the major problems confronting a number of orchardists or prospective orchardists is that of the price to pay for an orchard or additional acres of orchard. The price paid for orchards that have recently been purchased in the area is one guide that has been used. However, this may be misleading as the circumstances surrounding the purchase may be considerably different from those faced by other prospective purchasers. The location and age of the orchard and the potential of the land for future orchards or subdivision are extremely important in determining the price. Expectations with respect to future prices for the fruit are also very important.

It is likely that the number of sales and purchases of orchards will be at a relatively high level in the coming years. One reason for this is that is some areas a relatively large amount of orchard land is being purchased for subdivision purposes. The pricing of these orchards is beyond the realm of this investigation. Many of these orchardists desire to remain in fruit or nut production and are in the market for another orchard. A second, and perhaps more important, reason for the expected high level of sales and purchases is that many operators desire to increase the size of their present orchard enterprise. With the increase in the mechanization of fruit production the size of the operation becomes a more important factor as a means of reducing per unit costs.1/ A number of relatively small fruit producers, faced with rising

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1/ The investigation is not primarily concerned with economies of scale or size. However, the relationship between increasing the size of the operation and the pricing of orchards will be investigated. Increasing the size of the operation may also enable the operator to reduce costs through economies in the acquisition of inputs.

factor costs and perhaps constant or even lower product prices, may have to either expand or sell their orchard.

The investigation is primarily concerned with the pricing of cling peach orchards. However, the technique used in the analysis should be applicable to a number of other types of orchards.

Objectives

The major objectives of the investigation are:

1. To determine the value of cling peach trees of various ages and productive ability.
2. To determine the return for orchard land and management for trees of different productive ability.
3. To investigate the effects of changes in the prices received for cling peaches upon the value of the trees and the return for land and management.
4. To investigate the effects of differences in annual cost conditions upon the value of the trees and the return for land and management.

Procedure

Yields, costs and prices to be used in the investigation are presented in Section II. A discussion of how these were obtained is omitted as another publication by the author contains this information. In Section III the technique of analysis is developed. The technique is discussed in considerable detail. Although the residual imputational procedures and discounting procedures used are not new, the way they are combined in the technique of analysis is somewhat different. The value of the trees and the returns for land and management are also presented in this section because it appeared logical to use the basic

factor costs and yield, according to some known production pattern, may have a [illegible] [illegible] as well [illegible].

The investigation is primarily concerned with the [illegible] [illegible]. However, the technique used in the analysis should be applicable to [illegible] types of [illegible].

OBJECTIVES

The major objectives of this investigation are:

1. To evaluate the value of [illegible] ages and [illegible].
2. To determine the returns for [illegible] and [illegible] the [illegible] production ability.
3. To investigate the [illegible] in the [illegible] increasing [illegible] upon the [illegible] and [illegible] land and management.
4. To investigate the [illegible] upon the value of the [illegible] and the [illegible] land and management.

PROCEDURE

In this study [illegible] used in the investigation are discussed in Section II. A discussion of the [illegible] notion [illegible] in Section IV the technique of analysis is developed. The technique is [illegible] Section II. Although the [illegible] procedures and [illegible] used [illegible] in the [illegible] are [illegible]. The [illegible] of the [illegible] and [illegible] presented in this section [illegible].

yields, prices and costs in illustrating the application of the methodology. The anticipated price received for cling peaches will vary among orchardists. Therefore, the effects of price changes on the value of the trees and the return for land and management are presented in Section IV.

Green dropping cling peaches (eliminating part of the fruit by knocking all of the fruit from every n^{th} tree early in the season) and cannery diversion (diverting part of the harvested crop at the cannery) have been prevalent practices in recent years. These practices have been instituted to increase the price received for cling peaches by the orchardists through decreasing the supply. The effects of these practices upon the value of the trees and the return for land and management are considered in Section V. Also the prices of peaches that would result in the same value of the trees and returns for land and management without green drop or cannery diversion are calculated in this section.

In many instances the orchardist does not have the same yield anticipations for the present orchard and the replacement orchard. The introduction of biological innovations or even mechanical innovation as well as different cultural practices affect his anticipations with respect to the replacement orchard. The effects of different yield anticipations on the pricing of an orchard are investigated in Section VI. The effects of changes in the cost of production are examined in Section VII. Particular emphasis is placed upon the effects of changes in fixed costs of production. This has particular relevance when the effect of expanding the size of the orchard upon the value of the trees and the return for land and management is considered. The last section is a brief summary of the major findings of this investigation.

similar values and cost. In illustrating the applications of these measures, the Philippine rice [illegible] will apply [illegible]. Incidentally, [illegible] simple [illegible] change [illegible] from the land and management are presented in Section IV.

[illegible] (illustration [illegible]) [illegible] tree [illegible] in the [illegible] (illustration [illegible]) the cultivated crop of the country [illegible] times in recent years. These practices have been instituted to increase the yield [illegible] the [illegible] supply. The purpose of these practices [illegible] the [illegible] from the land and management are considered [illegible] that result in the same value of the [illegible] the [illegible] crop of country [illegible] in this country.

[illegible] the land [illegible] with the [illegible] and the [illegible] in [illegible] (see Section II). [illegible] in the [illegible] the [illegible] in Section III. [illegible] in the land costs of [illegible]. [illegible] the land and management is [illegible] of the [illegible] in this [illegible].

II. YIELDS, COSTS AND PRICES

The basic data on yield and the related physical inputs used in this investigation were primarily obtained from a survey of cling peach producers in California in 1957. The costs are based upon 1959 and 1960 price levels. This information is presented in detail in another publication.1/ Therefore, a discussion of how the yields and costs were obtained will be omitted.

Yields

Yields by age of tree for 5 different yield anticipations are presented in Table 1 and Figure 1. The lowest yield anticipation (number 1) for a block of trees has a maximum yield of 15 tons per acre. The highest yield anticipation (number 5) has a maximum yield of 22 tons per acre. Three of the yield anticipation curves are rather flat between the 8th and the 20th years while 2 of the curves indicate that the maximum yield is reached in year 11. Although these 5 yield anticipation curves do not cover a very large number of the production curves that actually exist, they do cover a wide range of production possibilities. Thus, if an orchardist's yield anticipation lies between 2 of the representative curves constructed, he could probably be able to successfully interpolate the results for his particular yield anticipations.

Later in the analysis the yields will be adjusted in order to determine the effect of green drop upon the pricing of cling peach orchards.

1/ Faris, J. Edwin, The Economics of Replacing Cling Peach Trees (Berkeley: University of California, College of Agriculture, Agricultural Experiment Station, June 1960) (Giannini Foundation Mimeographed Report No. 232.)

TABLE 1

Five Representative Yield Anticipations by Age of Trees, Tons Per Acre

Age of tree (years)	Yield anticipations (tons per acre)				
	Number 1	Number 2	Number 3	Number 4	Number 5
	1	2	3	4	5
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	1.0	1.0	1.0	2.0	2.0
4	4.0	5.5	5.5	6.0	6.0
5	8.0	8.5	8.5	9.5	9.5
6	12.8	14.0	14.0	15.1	16.0
7	14.5	15.5	16.2	16.4	18.4
8	15.0	16.0	17.8	17.1	19.3
9	15.0	16.0	18.7	17.7	21.0
10	15.0	16.0	19.2	18.0	21.7
11	15.0	16.0	19.4	18.0	22.0
12	15.0	16.0	19.3	18.0	22.0
13	14.9	16.0	19.0	18.0	21.8
14	14.9	16.0	18.6	18.0	21.5
15	14.8	16.0	18.2	18.0	21.4
16	14.8	16.0	17.7	18.0	21.1
17	14.7	16.0	17.3	18.0	20.7
18	14.5	15.9	16.8	18.0	20.4
19	14.4	15.8	16.2	18.0	20.0
20	14.2	15.6	15.6	18.0	19.6
21	14.0	15.3	15.3	17.8	19.1
22	13.8	14.8	14.8	17.5	18.6
23	13.6	14.3	14.3	17.1	18.1
24	13.4	13.8	13.8	16.5	17.5
25	13.1	13.3	13.3	16.0	16.9
26	12.8	12.8	12.8	15.4	16.2
27	12.3	12.3	12.3	14.8	15.5
28	11.8	11.8	11.8	14.1	14.7
29	11.3	11.3	11.3	13.4	13.9
30	10.8	10.8	10.8	12.7	13.0
31	10.3	10.3	10.3	11.9	12.1
32				11.1	11.2
33				10.3	10.3

Source: Faris, J. Edwin, The Economics of Replacing Cling Peach Trees (Berkeley: University of California, College of Agriculture, Agricultural Experiment Station, June 1960) (Giannini Foundation Mimeographed Report No. 232.) The yields presented in this table decline somewhat faster after year 20 than those presented in the original source.

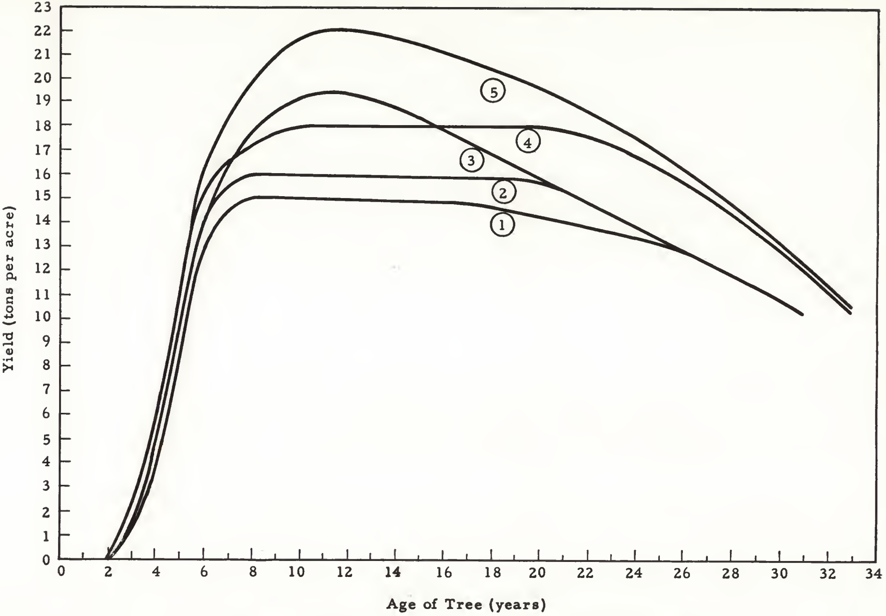

Figure 1. Five Representative Yield Anticipation Curves.

Costs

The costs include fixed and variable costs and are based upon a 40-acre cling peach orchard. The variable costs are a function of yields and the age of the trees and include such costs as pruning, thinning, irrigation, spraying, fertilization, harvesting, etc. The fixed costs include depreciation, taxes, insurance, interest, etc. However, the interest on or the payment for land is not included as a fixed cost but is treated separately in this analysis.

Later in the analysis the 40-acre size restriction will be removed to investigate the effect of increasing the size of the orchard operation upon the pricing of the orchard.

Prices

The prices received for cling peaches have been approximately $60 per ton in recent years. However, with the large increase in the planting of cling peach trees in recent years it appears that the price of cling peaches might drop to $55 or even $50 per ton in the near future if production and/or marketing controls are not imposed upon the crop. Therefore, at the outset, 3 price levels for cling peaches will be used in the analysis, $60, $55, and $50 per ton. A different set of prices will be considered when the effects of green drop and cannery diversion upon the pricing of orchards are investigated

III. PRICING OF ORCHARDS

What determines the value of a cling peach orchard? Basically it is the value of the net revenue that will be forthcoming from the orchard. The orchard is a composite of the various factors of production. Thus, the net revenue from the orchard operation is a result of how these various factors of production are combined and the price received for the product. The factors of production include land, labor, capital and management as well as uncontrollable factors such as climate and disease. An attempt was made to account for the uncontrollable factors in the yield estimates.

Residual Imputation Procedure

The problem of pricing a cling peach orchard is essentially that of determining the value of the land and the trees. In the analysis the residual method or procedure will be used to determine these values. E. O. Heady states that the residual imputational procedure implies:

> "(1) that except for 1 factor, the market price of a resource is equal to its marginal value product; and
>
> (2) that the total physical product can be broken up into shares such that
> (a) the reward to each factor is equal to its marginal productivity, and
> (b) the rewards so computed, just exhaust the total physical product.
>
> In summary, the residual imputations of agricultural economics assume that no residual can remain and that each factor can be imputed its exact reward".1/

The assumptions of the residual imputational procedure as stated by Heady are not apt to be met in very many instances. It is unlikely that the orchardist will be operating where the marginal value products are equal to the market prices for the inputs. Thus, the residual revenue would not accurately reflect the marginal value product of the residual input. In addition,

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1/ Heady, E. O., Economics of Agricultural Production and Resource Use, (New York: Prentice-Hall Inc., 1952), p. 407.

III. ANALYSIS OF RESEARCH

[illegible]

[illegible]

[illegible] that traditional [illegible]:

(1) [illegible]

(2) [illegible]

(a) [illegible]

(b) [illegible]

[illegible]

The assumptions of [illegible]

[illegible]

[1] [illegible] (New York: [illegible] Inc., 19[illegible]), p. [illegible]

it is doubtful that the marginal value products of all of the inputs would exactly exhaust the total product. Therefore, in this analysis the residual net revenue will not be considered as the marginal value product of the residual input. Rather the residual will indicate the net revenue remaining after all except a few inputs have been costed at market prices. In the analysis a series of residuals are obtained in order to arrive at a value for the trees. The first set of residuals obtained are referred to as the basic annual net revenues. They include all of the costs except the cost of (return to) management and the interest on the land and the establishing costs of the trees.

In one sense the basic annual net revenue could be considered as the return to land, management, and trees where the latter includes the capital invested in establishing the trees plus the time element in tree growth and production. As all of the residual net revenue is imputed to land, management, and trees any so called profit or loss will be absorbed by these inputs. Although this might appear as a great disadvantage, it does not invalidate the usefulness of this procedure for furnishing valuable information for making certain types of decisions. Under the assumed technical and price relationships, the residual imputational procedure can be used to indicate the amount that an orchardist might pay for land and trees. Thus, if the orchardist desired a certain return on his investment and for his management the amount that he can afford to pay for the land and trees can be determined.

Basic Annual Net Revenue

The annual net revenue per acre was calculated for the 5 different yield anticipations for cling peaches selling at $50, $55, and $60 per ton (see Appendix Tables 1-3). These annual net revenue figures are referred to as the basic annual net revenues. All of the costs except the cost of

management and the interest on both land and establishing costs of the trees are included.[1/]

In the following analysis it will be noticed that the stream of net revenues for the various yield anticipations are not calculated for the same number of years. For example, the net revenues are presented for 24 years for yield anticipation number 3 and for 28 years for yield anticipation number 4. This is because it would "pay" to replace the block of trees with yield anticipations similar to those for number 3 at the end of 24 years if the orchardists yield anticipations for the replacement orchard were also the same as those for number 3. Likewise it would pay for an orchardist whose yield anticipations for the present and the replacement orchard were the same as number 4 to replace the present block of trees at the end of year 28. The method used to determine the replacement date is presented in another publication.[2/]

Method Used to Determine Returns for Land and Management

The methodology will be put forth first in terms of the logic involved. An example will then be used to illustrate the use of the analytical technique.

The basic annual net revenue for any year, year j, as defined above might be expressed as:

(1) $NR'_j = Y_j - b_j - C_j$ where

NR'_j = the anticipated basic annual net revenue in year j

1/ Depreciation on trees is not included as the purpose of depreciation is to account for the investment required to establish the trees.

2/ Faris, J. E., op. cit.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Y_j = the anticipated gross revenue in year j

b_j = all anticipated operating or annual costs in year j except the cost of management and the interest on the investment in land and establishing costs

C_j = the planting costs in year j. This term is only applicable in the first 2 years when the original planting occurs and when young trees that have died are replanted.

To determine the value of the stream of net revenue at a point in time, it is necessary to express the net revenues for each year in terms of this common point in time. The present value of the anticipated stream of annual basic net revenues in year 0 can be expressed as:

$$(2) \quad NR'_0 + NR'_1 \frac{1}{(1+r)} + NR'_2 \frac{1}{(1+r)}^2 + \ldots\ldots + NR'_n \frac{1}{(1+r)}^n =$$

$$\sum_{j=0}^{n} NR'_j \frac{1}{(1+r)}^j = M \quad \text{where}$$

M is greater than 0. r is the discount rate for time preference. At the end of year n it is assumed that the orchard will be pulled and replaced.1/ If M is less than 0 it would be profitable to pull the trees immediately.

The problem is to allocate the quantity M to the trees and to land and management so that it is exactly exhausted. The trees will be considered first. The value of the trees is a function of the cost of establishing the trees plus the time element that is involved in the growth of the trees. In

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1/ The exact year that the trees would be replaced depends upon prices, costs,and anticipated yields for the replacement trees. The replacement age used at this point in the analysis is based upon the assumption that prices, costs,and yields are similar for the present trees and the replacement trees.

time period 0 it is assumed that the trees have not yet been planted or have just been planted so that the trees have not grown physically. Logically, then, the present value of the trees with respect to the time-growth element must be zero in time period 0. Thus the present value of net revenue (M) in year 0 must be attributable to land, management, and the interest on the investment required to establish the orchard.

It is assumed that the payment for land and management is a constant amount each year. This assumption may be questioned with respect to the payment for management in that more time might be required to manage a mature orchard than a very young orchard. However, when it is realized that the time required to make decisions will be approximately the same for young and old orchards and that the price paid for cling peaches is usually predetermined through bargaining associations this assumption may be quite valid. Also young trees require special care and the care of the trees in the early years can and probably will influence yields in later years.

Interest on investment or establishing costs is handled somewhat differently. Interest is charged only on the unpaid balance of the establishing costs. Thus, it is assumed that the establishing costs are repaid as soon as possible from the revenues from the replanted orchard. The primary reason for this assumption is to insure that the price of the orchard is consistent between the purchaser and the seller at all points in time. If the returns from the orchard operation are such that the establishing costs can be repaid in 10 years but the orchardist does not repay these costs until the end of year 15, the additional interest costs should be charged to consumption rather than the orchard operation.

time period 0 to 15 assumes that the trees have not yet been planted or have been planted or thinned. This time not given [illegible]. Logically, then, the present value of the trees when brought to the time-growth element must be also to time period 0. Thus the present value of net revenue (by 0) to year T must be attributable to land, management, and the interest on the investment required to establish the orchard.

It is assumed that the payment for land and management is a constant amount each year. This assumption may be questioned with regard to the cost of management in that more time might be required to manage an older orchard than a very young orchard. However, when it is realized that the time required to make decisions will be approximately the same for young and old orchards [illegible] through [illegible] this assumption [illegible]. Also young trees require special care and the care of the trees in the early years and constantly will influence yields in later years.

Interest on investment in establishing costs is handled somewhat differently. Interest is charged only on the unpaid balance of the establishing costs. Thus, it is assumed that the establishing costs are repaid as fast as possible from the revenues from the orchard. The primary reason for this assumption is to insure that the price of the orchard is consistent between the purchaser and the seller at all points in time. If the returns from the orchard operation are such that the establishing costs can be repaid in 10 years but the orchardist does not repay those costs until the end of year 15, the additional interest costs should be charged to consumption rather than the orchard operation.

The condition now can be stated for determining the return for land and management. This is expressed in equation (3).

$$(3) \quad NR_0' + \frac{\left(NR_1' + A_1\ i + K\right)}{(1+r)} + \frac{\left(NR_2' + A_2\ i + K\right)}{(1+r)^2} + \ldots + \frac{NR_n' + A_n\ i + K}{(1+r)^n} = 0$$

$$= \sum_{j=0}^{n} NR_j' \frac{1}{(1+r)}^j + i \sum_{j=1}^{n} A_j \frac{1}{(1+r)}^j + K \sum_{j=1}^{n} \frac{1}{(1+r)}^j = 0$$

where

NR_j' is the basic net revenue in time period j

A_j is the unpaid balance of the establishing cost

i is the interest rate on the establishing cost

K is the return for land and management.1/

The return for land and management (K) is a constant for each year and the interest on the unpaid balance of the establishing cost ($A_j i$) increases until the annual net revenue becomes positive. It then decreases until the establishing cost has been repaid at which point this term becomes zero. In the discussion of the residual imputational procedures it was pointed out that the pricing of land was arrived at by a series of residuals. The return for land and management is the residual after the interest on establishing costs have been subtracted from the basic net revenues.

<u>The Method Illustrated</u>.

Yield anticipation 2, with the price of peaches at $55 per ton will be used to illustrate the method explained above.

1/ This may be viewed as a cost to the firm. Therefore, K is added in equation (3) rather than substracted.

The basic annual net revenue for yield anticipation 2 (peaches at $55 per ton) is presented in Table 2. The present value, in year 0 for this stream of income was calculated using a 6 percent discount rate for time preference (column 3). The present values were then summed beginning of year 26 and summing through year 0. In this illustration the sum of the present values is approximately $1,200 in year 0 (column 4). This $1,200 in year 0 is prior to the time that the trees have been planted. Therefore, this return cannot be attributable to the trees but must be attributable to land, management, and the investment required to establish the orchard.

The problem is to determine the annual payment for land and management and the interest on the unpaid balance of the establishing costs that will result in a present value of net revenue of zero in year 0. This was arrived at by a series of approximations.[1/] A 6 percent interest rate for the interest on the unpaid balance of the establishing costs was used. The payment for land and management of $60 per year was arrived at using the approximations (Table 2, column 5). In order to check this the $60 per year was subtracted from the basic net revenue (Table 2, column 6). Interest was then calculated on the unpaid balance of the establishing costs (Table 2, column 7). The unpaid balance is the negative accumulated net revenue. All costs are included at this point. The adjusted annual net revenue is presented in column 8 in Table 2.

The present value, in year 0 was then calculated using the adjusted annual net revenues (Table 2, column 9) and summed (column 10). The sum of the present value of the adjusted net revenue is $.67 or for all practical

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1/ The formula $17X + X \left[\frac{1}{(1+r)}18 + \frac{1}{(1+r)}19 + \ldots + \frac{1}{(1+r)}\right]$ = the sum of the present values of the basic annual net revenue, when n = the year the trees are to be replaced, resulted in a close first approximation for the annual payment for land and management. This formula would not be applicable for other types of enterprises, however. Further adjustment usually had to be made in order for the payment for land and management to come out at the closest dollar value.

TABLE 2

Determination of the Annual Payment for Land and Management Per Acre
Yield Anticipation 2, Price of Peaches of 55 Dollars Per Ton

Year	Basic annual net revenue	Present value of net revenue a/	Sum of present values	Annual payments for land & mgt.	Annual net revenue incl. land & mgt.	Int. on unpaid bal. of est. costs b/	Adjusted annual net revenue	Present val. of adjusted annual net revenue a/	Sum of present value
1	2	3	4	5	2-5=6	7	6-7=8	9	10
0	-283.00	-283.00	1,199.90	0	-283.00	0	-283.00	-283.00	.67
1	-138.83	-130.97	1,482.90	60.00	-198.83	16.98	-215.81	-203.60	283.67
2	-159.57	-142.02	1,613.87	60.00	-219.57	29.93	-249.50	-222.06	487.27
3	-127.43	-106.99	1,755.89	60.00	-187.43	44.90	-232.33	-195.06	709.33
4	-30.81	-24.40	1,862.88	60.00	-90.81	58.84	-149.65	-118.54	904.39
5	63.86	47.72	1,887.28	60.00	3.86	67.82	-63.96	-47.79	1,022.93
6	211.00	148.76	1,839.56	60.00	151.00	71.66	79.34	55.97	1,070.72
7	258.11	171.67	1,690.80	60.00	198.11	66.89	131.22	87.26	1,014.75
8	253.20	158.86	1,519.04	60.00	193.20	59.02	134.18	84.18	927.49
9	209.83	124.20	1,360.18	60.00	149.83	50.97	98.86	58.52	843.31
10	229.47	128.14	1,235.98	60.00	169.47	45.04	124.43	69.48	784.79
11	223.03	117.51	1,107.84	60.00	163.03	37.57	125.46	66.09	715.31
12	217.63	108.16	990.33	60.00	157.63	30.05	127.58	63.41	649.22
13	217.63	102.02	882.17	60.00	157.63	22.39	135.24	63.40	585.81
14	217.63	96.26	780.15	60.00	157.63	14.28	143.35	63.40	522.41
15	217.63	90.82	683.89	60.00	157.63	5.68	151.95	63.41	459.01
16	219.13	86.25	593.07	60.00	159.13	0	159.13	62.64	395.60
17	219.13	81.38	506.82	60.00	159.13	0	159.13	59.09	332.96
18	216.30	75.77	425.44	60.00	156.30	0	156.30	54.75	273.87
19	210.80	69.67	349.67	60.00	150.80	0	150.80	49.82	219.12
20	202.47	63.13	280.00	60.00	142.47	0	142.47	44.42	169.30
21	189.97	55.89	216.87	60.00	129.97	0	129.97	38.22	124.88
22	169.15	46.94	160.98	60.00	109.15	0	109.15	30.28	86.66
23	148.33	38.83	114.04	60.00	88.33	0	88.33	23.13	56.38
24	127.50	31.49	75.21	60.00	67.50	0	67.50	16.69	33.25
25	106.67	24.85	43.72	60.00	46.67	0	46.67	10.88	16.56
26	85.85	18.87	18.87	60.00	25.85	0	25.85	5.68	5.68

a/ Calculated using the formula $\frac{1}{(1+r)^n}$ where r (the discount rate) = 6%.

b/ Calculated using the formula $(1+i)^n$ where i (the interest rate) = 6%.

purposes zero. Thus, in this illustration when the annual payment for land and management is \$60, using a 6 percent rate for interest on the unpaid balance of the establishing cost, the present value of the trees is zero in year 0.

Method Used to Determine Value of the Trees

The value of the trees is derived from the residual after the return for land, management, and the interest on the unpaid balance of the establishing costs are subtracted from the basic annual net revenues. The adjusted net revenues (NR_j) where

(4) $NR_j = NR'_j + A_j i + K$

are the correct figures to use in calculating the value of the trees. At the beginning of year n (the year the trees are to be replaced) the orchardist anticipates a net revenue of NR_n from the trees. However, this is not received until the fruit is harvested at the end of the year. Thus, the value of the trees would be $NR_n \frac{1}{(1+r)}$ at the beginning of year n. In year n-1 the orchardist would anticipate a stream of net revenue received at the end of year n-1 and year n. The former would not be received for 1 year and the latter for 2 years. Therefore, the value of the trees would be $NR_n \frac{1}{(1+r)}2 + NR_{n-1} \frac{1}{(1+r)}$ at the beginning of year n-1. The value of the trees in any year, year j, can be expressed as:

(5) $NR_n \frac{1}{(1+r)}j + NR_{n-1} \frac{1}{(1+r)}j-1 + \ldots + NR_j \frac{1}{(1+r)}$

<u>The Method Illustrated</u>.

Yield anticipation 2, with the price of peaches at \$55 per ton, will also be used to illustrate the method of determining the value of the trees. The adjusted annual net revenues (NR_j) are presented in Table 3, Column 2. A

[illegible]. Thus, it was illustrated [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible]

TABLE 3

Determination of the Per Acre Value of Trees by Age, Yield Anticipation 2, Price of 55 Dollars Per Ton

Year	Adjusted annual net revenue	Adjusted annual net revenue plus present value of future net revenue[a]	Value of trees at beginning of year[a]
1	2	3	4
0	-283.00	.72	.72
1	-215.81	300.74	283.72
2	-249.50	547.54	516.55
3	-232.33	844.86	797.04
4	-149.65	1,141.82	1,077.19
5	-63.96	1,368.95	1,291.47
6	79.34	1,518.88	1,432.91
7	131.22	1,525.91	1,439.54
8	134.18	1,478.37	1,394.69
9	98.86	1,424.84	1,344.19
10	124.43	1,405.53	1,325.98
11	125.46	1,357.96	1,281.10
12	127.58	1,306.44	1,232.50
13	135.24	1,249.59	1,178.86
14	143.35	1,181.21	1,114.35
15	151.95	1,100.13	1,037.86
16	159.13	1,005.07	948.18
17	159.13	896.69	845.94
18	156.30	781.81	737.56
19	150.80	663.04	625.51
20	142.47	542.97	512.24
21	129.97	424.53	400.50
22	109.15	312.23	294.56
23	88.15	215.26	203.08
24	67.50	134.54	126.93
25	46.67	71.06	67.04
26	25.85	25.85	24.39

a/ These columns are calculated by starting at year 26. The figure in column 3, year 26, is the adjusted annual net revenue. The figure in column 4, year 26, is the present value of $25.85 using a 6 percent value in column 4, year 26. The figure in column 4, year 26, is the present value of the figure in column 3, year 25. The procedure is followed up through year 0.

6 percent discount rate for time preference is assumed. Starting at year 26 (year n) the adjusted annual net revenue of \$25.85 is multiplied by $\frac{1}{1.06}$. This results in a figure of \$24.39 (Table 3, column 4) which is the per acre value of the trees at the beginning of year 26. At the beginning of year 25 the per acre value of trees is \$25.85 $\frac{1}{(1.06)^2}$ plus \$46.76 $\frac{1}{(1.06)}$ equals \$67.04.[1/] This process is continued through year 0. At the beginning of the year 0 the value of the tree is \$.72 or for all practical purposes zero. This is consistent with the logic that was postulated in an earlier part of this section.

In the illustration used the value of the trees at the beginning of the year reaches a maximum in year 7. This is to be expected as the trees have just passed the years of negative annual net revenues and are entering the years of maximum production. The value of the trees at the beginning of year 1 is \$283 or the cost of planting the trees in year 0. This is another indication of the consistency of this method.

Pricing of Trees and Land[2/]

In the above discussion the return for land and the return for management were not separated. To arrive at some figure for the pricing of the trees and land it is necessary to separate the return for land and the return for management

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1/ An easier method of calculation was used in determining the value of the trees. The results are the same, however. This method is as follows for the value of trees in year 25 = $\left[NR_{26} \frac{1}{(1+r)} + NR_{25}\right] \left[\frac{1}{1+r}\right]$. This method is illustrated by the arrows in Table 3, columns 3 and 4.

2/ The return for land and management and the value of the trees will be discussed separately throughout the analysis. The reason for this separation is that the value of the trees is a function of age and the return for land is a function of the return for management. To combine the value of the trees and the return for land in the discussion to obtain a value for the orchard would tend to hide some important relationships.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

as the latter will be furnished by the purchaser or operator. As the residual imputation procedure is being used any separation of the return for land and management must be made on a strictly arbitrary basis. Information on the opportunities available for the operator's managerial abilities would be helpful in determining the opportunity cost for management. This is extremely difficult to generalize about as the capabilities and opportunities of the operators vary considerably. Therefore, in this analysis several levels of management returns will be assumed and the residual will be assumed to be the annual return for land. The annual return for land must be capitalized in order to determine the price of land. This is accomplished by dividing the annual return for land by the capitalization or interest rate. This can be expressed as:

(7) Value of land = $\frac{K-Z}{i}$ where

K = the annual return for land and management

Z = the annual return for management

i = the capitalization rate or rate of return desired on the investment in land.

In addition to considering the return for land as the residual it is sometimes useful to consider the residual for management when land is assumed to be priced at some given amount. For example, if the prospective orchardist has just purchased some land for $1,000 per acre what return could he expect for his management if he planted the land to cling peaches? In a number of instances this type of question is as important as the question of the value of the land *per se*.

What can an individual pay for a cling peach orchard with yields similar to those of yield anticipations number 2. Using the assumption of a 40 acre

of the latter will be [illegible] by the [illegible] of operation. [illegible]

[illegible]

(7) Value of land = $\frac{r}{i}$ where

r = [illegible]

a = the annual [illegible]

i = the capitalization rate or rate of return [illegible]

in 1961.

In addition [illegible]

[illegible]

of the land use [illegible].

[illegible]

orchard it was determined that the return for management and land was \$60 per acre per year. How much of this should be allocated to land and how much to management? As stated earlier this is an arbitrary decision. One method of investigating this is to assume that the operator believes that his labor and management should return him some specified amount, e.g., \$5,000 per year. On 40 acres of cling peaches it will be assumed that his labor could replace approximately \$3,400 of hired labor. This leaves \$1,600 per year or \$40 per acre payment for his management function. Thus, only \$20 per acre remains for the payment for land. Capitalized at 6 percent the value of the land is determined to be \$333 per acre.

Another method of determining the proportions of the \$60 per acre return for land and management that is allocated to each factor is to assign a value for land and let management be the residual. For example, if the sales price for bare land is \$1,000 per acre and the capitalization rate is 6 percent the annual return for land would be \$60 per acre.[1/] This leaves <u>nothing</u> for the annual return for management.

The value of land and trees per acre for yield anticipation 2 with annual payments for management of \$0 and \$40 per acre is presented in Table 4. The maximum value of the trees and land is obtained in year 7. Even with no payment for management the maximum value is only \$2,440 per acre using a 6 percent capitalization rate. With a modest payment of \$40 per acre for management the maximum value of the land and trees is \$1,773 per acre.

1/ $\$1,000 = \frac{K-Z}{.06}$; $K-Z = \$60$.

TABLE 4

Value of Land and Trees Per Acre with an Annual Return for Management of 0 and 40 Dollars Per Acre, Yield Anticipation 2, Price 55 Dollars Per Ton

Year	Value of trees at beginning of year	Value of land with annual payment for mgt. of [a]		Value of land and trees with annual payment for mgt. of [a]	
		$0	$40	$0	$40
1	2	3	4	2+3=5	2+4=6
0	0	1,000	333	1,000	333
1	283	1,000	333	1,283	616
2	516	1,000	333	1,516	849
3	797	1,000	333	1,797	1,130
4	1,077	1,000	333	2,077	1,410
5	1,291	1,000	333	2,291	1,624
6	1,433	1,000	333	2,433	1,766
7	1,440	1,000	333	2,440	1,773
8	1,395	1,000	333	2,395	1,728
9	1,344	1,000	333	2,344	1,677
10	1,326	1,000	333	2,326	1,659
11	1,281	1,000	333	2,281	1,614
12	1,232	1,000	333	2,232	1,565
13	1,179	1,000	333	2,179	1,512
14	1,114	1,000	333	2,114	1,447
15	1,038	1,000	333	2,038	1,371
16	948	1,000	333	1,948	1,281
17	846	1,000	333	1,846	1,179
18	738	1,000	333	1,738	1,071
19	626	1,000	333	1,626	959
20	512	1,000	333	1,512	845
21	400	1,000	333	1,400	733
22	295	1,000	333	1,295	628
23	203	1,000	333	1,203	536
24	127	1,000	333	1,127	460
25	67	1,000	333	1,067	400
26	24	1,000	333	1,024	357

a/ The annual return for land is capitalized at 6 percent. Thus $60 ÷ .06 = $1,000 and $60 - $40 ÷ .06 = $333.

Pricing of Orchards with Yield Anticipations 1 Through 5

The value of trees and the annual return for land and management with cling peaches at $55 per ton is presented in Table 5 for yield anticipations 1 through 5. The maximum difference in the value of the trees between the lowest and the highest yield anticipations is approximately $850 per acre. The difference between the annual payment for land and management for these yield anticipations is $145. Assuming that the payments for management are the same for each of these yield anticipations the orchardist could afford to pay approximately $2,400 per acre more for land that would produce the high yields if he capitalized the difference at 6 percent.

Various assumptions with respect to land and management payments were made and the residual was calculated using 6 percent capitalization rates (Table 6). It is evident that a $100 per acre change in the price of land is associated with a $6 per acre change in the management residual. It is also evident that the yield anticipations have a large effect upon either the management residual or the land residual when the return for the other input is held constant.

It appears that when the price received for cling peaches is $55 per ton that yield anticipation 5 will yield a fairly substantial return to land and management. When the land is valued at $1,000 per acre and capitalized at the rate of 6 percent the management return is $114 per acre or $4,560 for 40 acres. However, even this management return plus the return on his labor would probably not exceed $8,000 per year. Yield anticipation 4 would probabl) not return more than $5,600 per year for the combined management and labor of the operator. Thus, it appears an orchardist with 40 acres of very good yielding peach trees might not obtain an annual income of much more than he coul obtain in off farm employment when the price of peaches is only $55 per ton. The above returns do not include the interest on the investment of other capital items that the orchardist receives.

Listing of [illegible] Yield Anticipations 1 through 5

The value of trees and the annual return for land and management with [illegible] prices of [illegible] per ton is presented in Table [illegible] for yield anticipations 1 through 5. The maximum difference in the value of the trees between the lowest and the highest yield anticipations is approximately [illegible] per acre. The difference between the annual return for land and management for these yield anticipations is [illegible]. Assuming that the returns for management are the same for each of these yield anticipations the orchardist could afford to pay approximately [illegible] per acre more for land that would produce the high [illegible].

[illegible] were [illegible] capitalization [illegible] (Table [illegible]). It is [illegible] in the [illegible] of land [illegible] in the management [illegible]. It [illegible] that the yield [illegible] the [illegible] as held constant.

It [illegible] that [illegible] per [illegible] and management. [illegible] of [illegible] percent [illegible] return [illegible] $4,[illegible] [illegible]. However, [illegible] management [illegible] probably not [illegible] yield anticipation [illegible] than [illegible] of the operators. Thus, it [illegible] orchardist [illegible] [illegible] the price [illegible] per acre. The above returns do not include the interest on the investment [illegible] that the orchardist receives.

TABLE 5
Value of Trees and Annual Return for Land and Management Per Acre, Yield Anticipations 1 Through 5, Price of Peaches of 55 Dollars Per Ton

Beginning of year	Value of trees and annual return for land and management for yield expectations:									
	Number 1		Number 2		Number 3		Number 4		Number 5	
	Value of trees	Annual return for land & mgt.	Value of trees	Annual return for land & mgt.	Value of trees	Annual return for land & mgt.	Value of trees	Annual return for land & mgt.	Value of trees	Annual return for land & mgt.
1	2	3	4	5	6	7	8	9	10	11
0	0	29.00	0	60.00	0	98.00	0	114.00	0	174.00
1	285	29.00	285	60.00	285	98.00	285	114.00	285	174.00
2	485	29.00	520	60.00	560	98.00	580	114.00	630	174.00
3	730	29.00	800	60.00	885	98.00	925	114.00	1,040	174.00
4	970	29.00	1,080	60.00	1,210	98.00	1,235	114.00	1,425	174.00
5	1,205	29.00	1,295	60.00	1,480	98.00	1,500	114.00	1,775	174.00
6	1,325	29.00	1,435	60.00	1,680	98.00	1,660	114.00	2,040	174.00
7	1,340	29.00	1,440	60.00	1,750	98.00	1,695	114.00	2,150	174.00
8	1,295	29.00	1,395	60.00	1,750	98.00	1,695	114.00	2,175	174.00
9	1,245	29.00	1,345	60.00	1,700	98.00	1,685	114.00	2,185	174.00
10	1,230	29.00	1,330	60.00	1,645	98.00	1,685	114.00	2,160	174.00
11	1,185	29.00	1,285	60.00	1,540	98.00	1,645	114.00	2,080	174.00
12	1,140	29.00	1,235	60.00	1,410	98.00	1,605	114.00	1,970	174.00
13	1,090	29.00	1,180	60.00	1,270	98.00	1,555	114.00	1,850	174.00
14	1,030	29.00	1,115	60.00	1,120	98.00	1,495	114.00	1,715	174.00
15	960	29.00	1,040	60.00	960	98.00	1,425	114.00	1,570	174.00
16	880	29.00	950	60.00	810	98.00	1,335	114.00	1,405	174.00
17	795	29.00	850	60.00	665	98.00	1,235	114.00	1,235	174.00
18	705	29.00	740	60.00	530	98.00	1,120	114.00	1,070	174.00
19	620	29.00	630	60.00	405	98.00	1,000	114.00	905	174.00
20	535	29.00	515	60.00	300	98.00	870	114.00	745	174.00
21	455	29.00	405	60.00	210	98.00	735	114.00	600	174.00
22	375	29.00	300	60.00	135	98.00	600	114.00	460	174.00
23	300	29.00	205	60.00	75	98.00	465	114.00	335	174.00
24	225	29.00	130	60.00	30	98.00	345	114.00	220	174.00
25	160	29.00	70	60.00	*	*	240	114.00	125	174.00
26	100	29.00	30	60.00	*	*	145	114.00	50	174.00
27	50	29.00	5	60.00	*	*	75	114.00	*	*
28	15	29.00	*	*	*	*	25	114.00	*	*
29	*	*	*	*	*	*	*	*	*	*

TABLE 6

Land and Management Residuals Per Acre with Various Assumptions for the Return for Land and Management, Yield Anticipations 1 Through 5, Price of Peaches of 55 Dollars Per Ton

Assumptions with respect to returns to land and management	Yield Anticipations				
	Number 1	Number 2	Number 3	Number 4	Number 5
	1	2	3	4	5
Annual return for land & management	$ 29	$ 60	$ 98	$ 114	$ 174
Management residual using a 6 percent capitalization rate for land when the price of land is					
$ 800 per acre	-19	12	50	66	126
$1,000 per acre	-31	0	38	54	114
$1,500 per acre	-61	-30	8	24	84
Land residual capitalized at 6 percent when the return to management is:					
$ 40 per acre	-183	333	967	1,233	2,333
$ 60 per acre	-517	0	633	900	1,900
$ 100 per acre	-1,183	-667	-33	233	1,233

The effects of changes in the capitalization rate are not presented in the analysis. In order to show the effects of a change in the capitalization rates, the interest rate charged on the non-land fixed investments would have to be changed to correspond with the new capitalization rate. This is assuming that the orchardist would desire the same rate of return from all of the investments in the orchard operation. An interest rate of less than 6 percent would increase the size of the basic annual net revenues which would increase the return for land and management. This would result in larger residual returns for land and management than are presented in Table 6. A 3 percent interest rate and capitalization rate, for example, would more than double the residuals presented in Table 6. A 10 percent interest rate and capitalization rate might decrease the magnitude of the residuals presented in Table 6 by as much as 50 percent.

IV. THE EFFECTS OF A CHANGE IN THE PRICE RECEIVED FOR CLING PEACHES

The expected or anticipated flow of net revenue from an orchard is the primary determinant of the pricing of an orchard. The net revenue is a function of the yields, costs and prices. In this section, the effect of changes in prices received for cling peaches will be investigated.

Value of the Trees

What effect does a $5 per ton increase or decrease in the anticipated price have upon the value of the trees? This information is presented in Table 7 for trees 7, 14, and 21 years of age and in Appendix Table 4, for all relevant

The effects of changes in the capitalization rate are not presented in the analysis. In order to show the effects of a change in the capitalization rates, the interest rate charged on the non-land fixed investments would have to be changed to correspond with the new capitalization rate. This is assuming that the orchardist would obtain the same rate of return from all of the investments in the orchard operation. An interest rate of less than 6 percent would increase the size of the residual net revenues which would increase the return for land and management. This would result in larger residual returns for land and management than are presented in Table 6. A 3 percent interest rate and capitalization rate, for example, would more than double the residuals presented in Table 6. A 12 percent interest rate and capitalization rate might decrease the magnitude of the residuals presented in Table 6 by as much as 50 percent.

IV. IMPLICATIONS OF A CHANGE IN THE PRICE RECEIVED FOR CLING PEACHES

The expected or anticipated flow of net returns from an orchard is the primary determinant of the pricing of an orchard. The net revenue is a function of the yields, costs and prices. In this section, the effect of changes in prices received for cling peaches will be investigated.

Value of the Trees

What effect does a $5 per ton increase or decrease in the anticipated price have upon the value of the trees? This information is presented in Table 7 for trees 7, 14, and 21 years of age and in Appendix Table 4, for all relevant

TABLE 7

Value of Trees for Selected Ages and Annual Returns for Land and Management by Yield Anticipations, Peaches at 50, 55, and 60 Dollars Per Ton

Yields and Prices	Value of trees per acre at: 7 years	14 years	21 years	Annual return for land & management
	1	2	3	4
Yield anticipation No. 1				
Peaches @ $50/ton	--	--	--	--
Peaches @ $55/ton	1,340	1,030	455	29
Peaches @ $60/ton	1,590	1,245	570	76
Yield anticipation No. 2				
Peaches @ $50/ton	1,185	895	305	9
Peaches @ $55/ton	1,440	1,115	405	60
Peaches @ $60/ton	1,685	1,325	500	112
Yield anticipation No. 3				
Peaches @ $50/ton	1,445	900	155	43
Peaches @ $55/ton	1,750	1,120	180	98
Peaches @ $60/ton	2,030	1,325	275	154
Yield anticipation No. 4				
Peaches @ $50/ton	1,405	1,225	585	56
Peaches @ $55/ton	1,695	1,495	735	114
Peaches @ $60/ton	1,980	1,765	885	171
Yield anticipation No. 5				
Peaches @ $50/ton	1,800	1,420	475	110
Peaches @ $55/ton	2,150	1,715	600	174
Peaches @ $60/ton	2,505	2,015	735	240

ages of trees. Generally, a $5 per ton increase or decrease from the $55 per ton price resulted in a 20 to 25 percent change in the value of the trees. Thus, a 10 percent change in price resulted in a 20 to 25 percent change in tree valuation. In terms of dollars the $5 change in the price of cling peaches changed the per acre value of 7 year old trees by $250 to $300, 14 year old trees by $200 to $300, and 21 year old trees by $100 to $150. From the above it is evident that a change in price of peaches has a very significant effect upon the value of the trees.

The value of the trees per acre for 7 year old trees was plotted for the 3 price levels and the 5 yield anticipations. These relationships are linear (see Figure 2). Therefore, the relationships between the price received per ton of peaches and the value of the trees were extrapolated over a much wider price range. The values presented in Figure 2 for 7 year old trees are about the maximum values attained by the trees and for older trees the values would be much less than indicated in this figure. The value of the trees is affected greatly by the yield anticipations as well as the price of peaches. The analysis indicates, for example, that a $2,000 per acre valuation for 7 year old trees can be a result of yield anticipation 1 and a price of $68.50 per ton or yield anticipation 5 and a price of $53 per ton, etc. (see Figure 2).

In examining the value of the trees it is noticed that 2 or 3 different yield-price combinations result in approximately the same annual net return for land and management. For example, 3 of the different yield-price combinations have returns for land and management that fall within $110 to $114. These are yield anticipations 2, 4, and 5 with a price of peaches of $60, $55, and

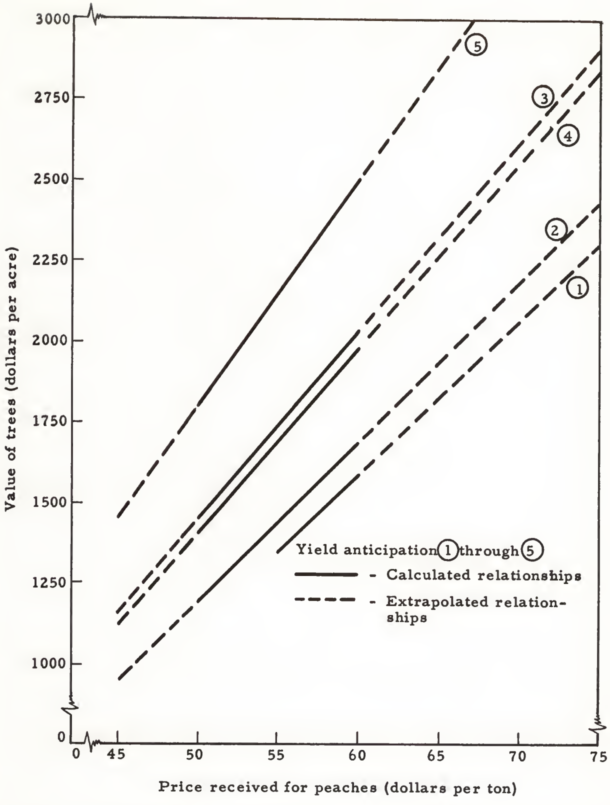

Figure 2. Value of Trees Per Acre for Seven Year Old Trees by Price Received for Peaches, Yield Anticipations 1 Through 5.

$50 per ton, respectively. The per acre value of the trees was compared for the 3 yield-price combinations (see Figure 3). The value of the trees is almost identical for the first 6 years. After this the nature of the production anticipations becomes dominant. The very high yields for yield anticipation 5, from the 6th to the 15th year, result in a definite peak in the value of the trees in these years. The relatively high and stable yields for yield anticipation 4, from the 9th to the 20th year, result in a flatter peak for the value of the trees. However, the value of the trees is quite close for all three yield-price combinations with a maximum divergence of about $250 per acre. Also part of this divergence in the tree values is a result of the differences in the length of life of the trees. If the length of life of the trees for yield anticipation 4 had been 26 years rather than 28 years the value of the trees would have been somewhat less for yield anticipation 4. This would have increased the annual return for land and management although not nearly as much as the value of the trees.

Return for Land and Management

Although the effect of price changes upon the value of the trees is quite large the effect upon the value of land for orcharding is even larger. A $5 change in the price received for cling peaches results in a difference in the annual return for land and management varying from $47 per acre for yield anticipation 1 to $66 for yield anticipation 5 (Table 7). The mean difference is approximately $55. Fifty-five dollars capitalized at 6 percent is in excess of $900. Thus, a $5 per ton change in price will, on the average, change the capitalized value of the land more than $900 per acre (assuming that the return for management is a constant amount).

560 per ton, respectively. [illegible] the [illegible] value of the [illegible] was [illegible] for the 2 [illegible] combinations (see Figure 7). The value of the trees is almost identical for the first [illegible] years. [illegible] production principal [illegible]. The [illegible] yield anticipation [illegible] from the [illegible] to the 9th year, resulting in [illegible] gain in the value of the trees in those years. The [illegible] for yield anticipation [illegible] to the [illegible] results in a [illegible] peak for the value of the [illegible]. However, the value of the trees is quite close for all three yield [illegible] combinations with [illegible] about $850 per acre. [illegible] this [illegible] result of the difference in the [illegible]. If the [illegible] of [illegible] the trees [illegible] 20 years the value of the [illegible] would have been [illegible] anticipation [illegible]. This would [illegible] increased the [illegible] although [illegible].

Return for land and management

Although the effect of price changes upon the value of the trees is quite large the effect upon the value of land [illegible] is [illegible]. A 5% change in the price [illegible] results in a difference in the annual return [illegible] per acre for yield anticipation I [illegible] (Table 1). The [illegible] difference is approximately [illegible] is an [illegible] of [illegible]. Thus, [illegible] change the [illegible] return for land [illegible] more than [illegible] per acre [illegible] the return for management [illegible] amount.

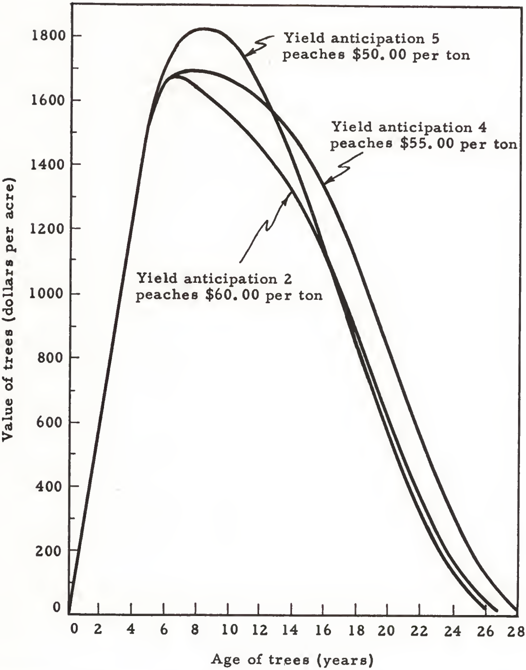

Figure 3. Value of Trees Per Acre by Age of Trees for Three Yield-Price Anticipations with Approximately Identical Returns to Land and Management.

The return for land and management for the three price levels and the 5 yield anticipations were plotted in Figure 4. These relationships are also linear so the lines for each yield anticipation were extended or extrapolated. A large number of comparisons can be made from this graph with respect to the returns for land and management resulting from various peach prices or the price required from peaches in order to obtain a specified return.

The yield anticipation is very important in determining the return for land and management. For example, the difference between the return for land and management for yield anticipations 1 and 5 is $145 with the price of peaches at $55 per ton. Capitalizing this return at 6 percent this amounts to more than $2,400 per acre. This analysis also indicates that an orchard with yield anticipation 1 would have to receive approximately $64 per ton for peaches in order to obtain the same return for land and management that an orchard with yield expectations 5 obtains when peaches are only $50 per ton.

V. THE EFFECTS OF GREEN DROP AND CANNERY DIVERSION

At the present time it would be unrealistic to consider the pricing of cling peach orchards without taking into consideration the effect that green drop and cannery diversion have upon net revenue. In this analysis it is assumed that the annual green drop will be 15 percent of the total crop. Thus, the yields will be assumed to be 15 percent less than those presented in Table 1. In addition a 5 percent cannery diversion will be assumed for the tonnage delivered to the cannery. This results in a total decrease of 19.25 percent in marketable cling peaches. Stated in another way this means that the orchardists yields will only be 80.75 percent of those presented in Table 1.

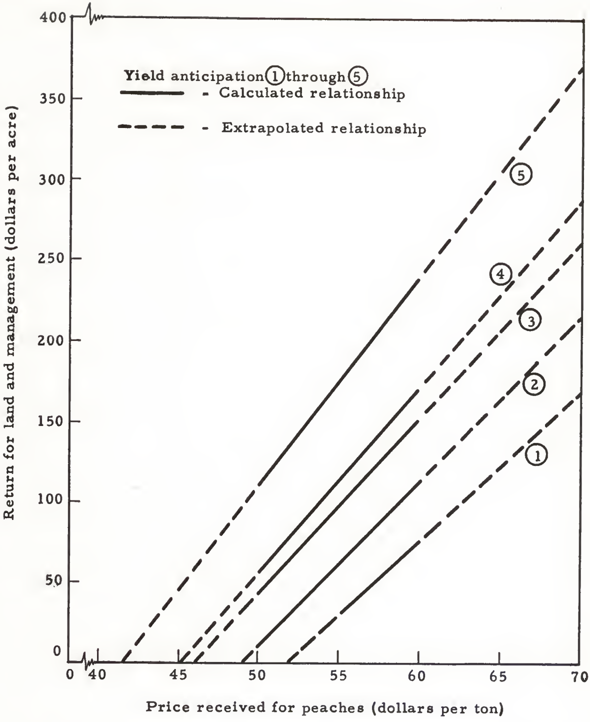

Figure 4. Returns for Land and Management Per Acre by Price Received for Peaches, Yield Anticipations 1 Through 5.

There are some reductions in costs, however. It is assumed that the cost of knocking all of the peaches from the trees, as is the case in green dropping, is only 3/4 of the cost of thinning. Also the trees that are green dropped do not need to be propped or harvested. However, all of the other operations, such as fertilizing, irrigating, spraying, etc. are assumed to be the same for the green drop and non-green drop trees. The tonnage that moves into cannery diversion has the same costs to the orchardists as peaches that are processed.

Value of the Trees

The effects of a 15 percent green drop and a 5 percent cannery diversion are presented in Table 8. The green drop and cannery diversion has the effect of decreasing the value of the trees by 20 to 30 percent in most instances. For the 7 year old trees this amounts to a $400 to $600 per acre decrease in the value of the trees. The decrease in the value of the 21 year old trees is only $100 to $200 per acre. However, the percentage decrease in tree values is approximately the same for 7 year old and 21 year old trees.

In the previous section it was demonstrated that the relationship between the price received for peaches and the value of the trees is a linear relationship. Therefore, it is possible to interpolate or extrapolate. The value of the trees when the price of peaches is $60 per ton with a 15 percent green drop and a 5 percent cannery diversion is equal to the value of the trees when the price of peaches is approximately $52 per ton but no green drop or cannery diversion is evoked. Likewise, the value of the trees is approximately equal with a $55 per ton price for peaches and green drop and cannery diversion and $47 per ton with no green drop or cannery diversion.

[illegible]

[illegible]

[illegible]

[illegible]

TABLE 8

Value of Trees for Selected Ages and Annual Returns for Land and Management for a 15 Percent Green Drop and 5 Percent Cannery Diversion and for No Green Drop or Diversion, Various Peach Prices, Yield Anticipations 1 Through 5

Yield anticipations value and returns	Value and returns per acre (dollars) for: Green drop and cannery diversion with the price of peaches of: $55/ton	$60/ton	No green drop or cannery diversion with the price of peaches of: $50/ton	$55/ton	$60/ton
	1	2	3	4	5
Value of 7 year old trees per acre					
Yield anticipation 1	--	--	--	1,340	1,590
Yield anticipation 2	--	1,240	1,185	1,440	1,685
Yield anticipation 3	1,285	1,515	1,445	1,750	2,030
Yield anticipation 4	1,235	1,460	1,405	1,695	1,980
Yield anticipation 5	1,585	1,850	1,800	2,150	2,505
Value of 14 year old trees per acre					
Yield anticipation 1	--	--	--	1,030	1,245
Yield anticipation 2	--	945	895	1,115	1,325
Yield anticipation 3	765	950	900	1,120	1,325
Yield anticipation 4	1,070	1,280	1,225	1,495	1,765
Yield anticipation 5	1,240	1,465	1,420	1,715	2,015
Value of 21 year old trees per acre					
Yield anticipation 1	--	--	--	455	570
Yield anticipation 2	--	330	305	405	500
Yield anticipation 3	115	170	155	210	275
Yield anticipation 4	500	620	585	735	885
Yield anticipation 5	405	495	475	600	735
Annual return for land and mgt.					
Yield anticipation 1	--	--	--	29	76
Yield anticipation 2	--	17	9	60	112
Yield anticipation 3	8	51	43	98	154
Yield anticipation 4	18	65	56	114	171
Yield anticipation 5	67	120	110	174	240

Return for Land and Management

Results similar to those for the value of the trees were obtained for the return for land and management (Table 8 and Figure 5). In Figure 5 the linear relationships between the price for cling peaches and the returns for land and management are presented under the assumption that no green drop or cannery diversion is envoked. The returns for land and management with peaches at $60 and $55 per ton but a 15 percent green drop and a 5 percent cannery diversion are also plotted on the graph. For example, the return for land and management under the green drop assumption and a $60 per ton price is $17 for yield anticipation 2. This return of $17 intersects yield anticipation curve 2, under the assumption of no green drop or cannery diversion, at a little less than $51 for the price received for peaches. This procedure was followed for each of the 5 yield anticipations and for the 2 prices received for peaches. The returns for land and management are approximately equal under the assumption of a $60 price with green drop and cannery diversion and a $51 per ton price without green drop or cannery diversion. The $55 price with green drop and cannery diversion is approximately equal to a $47 price without green drop or cannery diversion.

A more complete graphic comparison of the effects of green drop and cannery diversion is presented in Figure 6. For example, the line "ab" in Figure 6 indicates a return for land and management of $130 per acre. By determining the point of intersection of this line with the lines for the different yield anticipations under the assumption of green drop or no green drop the price for peaches required to result in the return can be determined. Line "cd" indicates the returns to land and management that results from a $65 price for

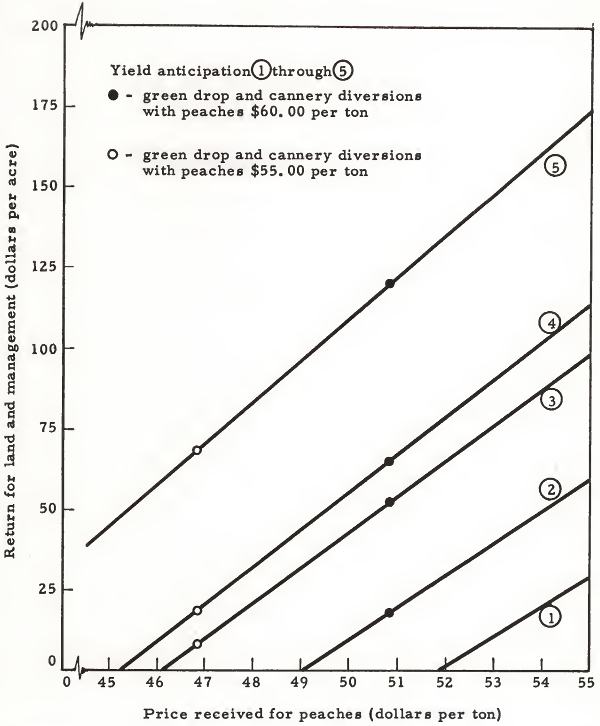

Figure 5. The Effect of a 15 Percent Green Drop and 5 Percent Cannery Diversion Upon the Return to Land and Management and the Price Received for Peaches, Yield Anticipations 1 Through 5.

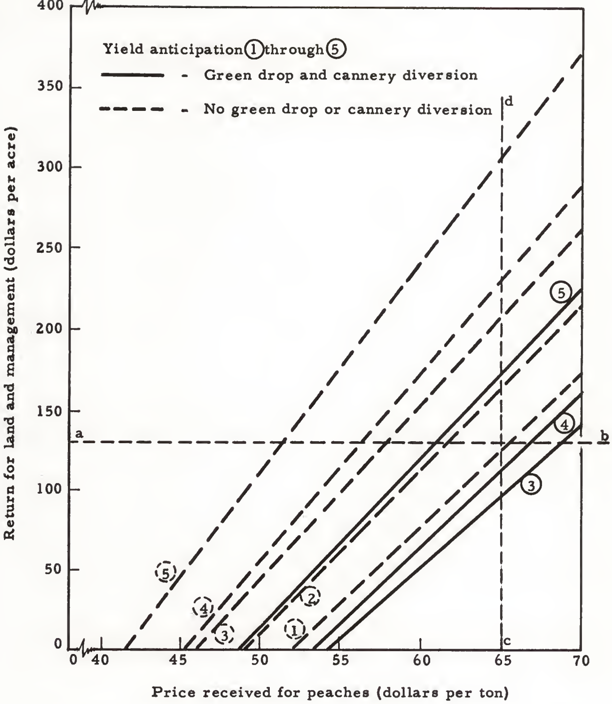

Figure 6. Comparison of Returns for Land and Management and the Price Received for Peaches, Green Drop and Cannery Diversions Versus No Green Drop and Cannery Diversion, Yield Anticipations 1 Through 5.

peaches under the various yield and green drop assumptions. This analysis indicates that when a 15 percent green drop and a 5 percent cannery diversion is imposed on the producers the price received for peaches must increase by $8 to $11 per ton over what the price would have been without these restrictions in order for the operator to have the same return for land and management.

The return for land and management from the highest producing trees (yield anticipation 5) with green drop and cannery diversion and a price for peaches of $60 per ton is $120 per acre. If $60 of this is a return for land then $60 per acre would be available for the managerial function. This would amount to a total of $2,400 per year for a 40 acre orchard. This appears to be rather low relative to the returns forthcoming from a number of alternatives other than producing cling peaches. If the trees have a yield similar to that of yield anticipation 4, which is considered a very good yield, the return for management would be approximately $5 per acre under the conditions stated above.

VI. THE EFFECTS OF A CHANGE IN YIELD ANTICIPATIONS

There are two major types of changes in yield anticipations that will affect the pricing of cling peach orchards. The first is a difference in yield anticipations held by individuals for the present orchard. The second is that of differences in yield anticipations between the present orchard and the replacement orchard. The effect of the former will be investigated first.

Differences in Yield Anticipations for the Present Orchard

For purposes of illustration it is assumed that an orchardist is considering the purchase of an orchard that he believes is suffering from poor

management practices. The orchardist believes that the yields from this orchard can be increased from yield anticipation 2 to yield anticipation 4 by the application of better management and production techniques. In this instance the yield anticipations for the present owner of the orchard would be approximately 2 tons per acre lower than the yield anticipations of the prospective purchaser. The annual return for land and management, when the price of peaches is $55 per ton, is $60 per acre for yield anticipation 2 and $114 for yield anticipation 4. Most, if not all, of the $54 per acre difference in the return for land and management probably should not enter into the pricing of the orchard. This is because the increase in yields is assumed to be a function of better management techniques and therefore would be a return for management. However, as it is not possible to separate the return for land from the return for management except on an arbitrary basis the amount that this would enter into the pricing of the orchard is indeterminant. This $54 per acre difference would, however, permit the purchaser to pay a higher price for the orchard than would be justified under the lower yield anticipations.

The major difference in the pricing of the orchard probably would occur in determining the value of the trees. When the trees are 15 to 20 years of age the difference in the value of the trees, in this illustration, is approximately $375 per acre. Thus, the prospective purchaser could pay approximately $375 more per acre for the trees than would be justified by the present yields.1/ The price paid, of course, would be determined by the bargaining position of the buyer and the seller. However, this type of analysis can be helpful in determining the upper limit that a purchaser can pay for an orchard that he expects to improve.

1/ See Appendix Table 4, columns 6 and 12.

Differences in Yield Anticipations Between the Present and the Replacement Orchard

Thus far in this investigation it has been implicitly assumed that the orchardist anticipates the yields of the replacement orchard to be similar to those of the present orchard. In many orchard operations this is not a valid assumption. Although in some instances the orchardist would expect the yields from the following block of trees to be lower than the yields from the present block, the reverse situation is much more likely to prevail. Therefore, only an increase in anticipated yields will be considered in the following analysis. How much more can the orchardist pay for an orchard when he expects the yields from the replacement trees to be higher than the yields from the present trees? Again it is necessary to consider the effect upon the value of the trees separately from the return for land and management.

Value of the Trees

The value of the trees of the present orchard will usually be decreased. This is because it will usually be profitable to replace the present orchard earlier than if the yield anticipations remained the same for the replacement orchard. By replacing the trees at an earlier age the stream of anticipated revenue from the present trees is made shorter. Consequently the present value of the stream of revenue is reduced.

Reductions in the value of the trees resulting from an increase in yield anticipations with respect to the replacement orchard were calculated for 2 cost-price conditions. These were for peaches at $55 per ton with no green drop (see Table 9) and for peaches at $60 per ton with a 15 percent green drop and a 5 percent cannery diversion (see Table 10). The reduction in the value of the present trees decreases as the age of the trees increases. For example, the reductions in the value of the trees is $430 per acre in year 15 when the

Differences in yields [illegible]

Thus far [illegible]

[illegible]

[illegible]

[illegible] the following [illegible]

[illegible]

raised from [illegible]

[illegible]

The value [illegible]

[illegible]

TABLE 9

Reductions in Value of Trees Per Acre Resulting From an Increase in Yield Anticipations for the Replacement Trees, Peaches at 55 Dollars Per Ton

Yield anticipations	Reduction in value of trees at beginning of year (dollars per acre)										
	15	17	19	21	22	23	24	25	26	27	28
	1	2	3	4	5	6	7	8	9	10	11
Increase in yield anticipations from:											
Anticipation 1 to											
Anticipation 2	280	250	220	185	165	140	115	95	70	45a/	15
Anticipation 3	595	525	450	365	315	270	215a/	160	100	50	15
Anticipation 4	710	625	525	420	360	295a/	225	160	100	50	15
Anticipation 5b/	960	795	620	455	375	300	225	160	100	50	15
Anticipation 2 to											
Anticipation 3	310	275	235	185	155	125	95	60a/	30	5	
Anticipation 4	430	380	315	245	205	160	115a/	70	30	5	
Anticipation 5	830	705	555	390a/	300	205	130	70	30	5	
Anticipation 3 to											
Anticipation 4	115	100	75	20	30	30	15a/				
Anticipation 5	515	425	315	165a/	135	75	30				
Anticipation 4 to											
Anticipation 5	525	475	420	350	310	265	225	180	125a/	75	25

a/ End of year in which present orchard would be replaced.

b/ The present orchard would be replaced immediately.

TABLE 10

Reductions in Value of Trees Per Acre Resulting From an Increase in Yield Anticipations for the Replacement Trees, Peaches at 60 Dollars Per Ton With a 15 Percent Green Drop and 5 Percent Cannery Diversion

Yield anticipations	Reduction in value of trees at beginning of year (dollars per acre)										
	15	17	19	21	22	23	24	25	26	27	28
	1	2	3	4	5	6	7	8	9	10	11
Increase in yield anticipations from:											
Anticipation 2 to											
Anticipation 3	275	240	200	155	135	105	80[a]	50	15		
Anticipation 4	380	325	270	205	170	130	95[a]	50	15		
Anticipation 5	730	610	475	325[a]	240	160	100	50	15		
Anticipation 3 to											
Anticipation 4	105	85	60	45	35	25	15[a]				
Anticipation 5	455	370	275	165[a]	105	55	20				
Anticipation 4 to											
Anticipation 5	475	440	380	310	280	240	200	155	110[a]	60	20

a/ End of year in which the present orchard would be replaced.

yields increase from anticipation 2 for the present orchard to anticipation 4 for the replacement orchard (Table 9). In year 24 the reduction in the value of the present trees is only $115 per acre. The higher the yield anticipation for the replacement orchard the greater the reduction in the value of the present trees. For example, the reduction in the value of the trees is $430 per acre in year 15 when the yields increase from anticipation 2 for the present orchard to anticipation 4 for the following orchard (Table 9). However, the reduction in the value of the present trees is $830 per acre for 15 year old trees if the yield anticipations are number 5 rather than number 4 for the replacement orchard. This is a result of the present trees being replaced at an earlier age because of the better alternative from the replacement trees. The end of the years in which the present orchards would be replaced under various yield anticipations for the replacement trees are also presented in Tables 9 and 10. When the age of the trees exceed the replacement age indicated the value of the trees is zero. Therefore, the reduction in the value of the trees in the years beyond the year that the present trees should have been replaced is such that the value of the trees is zero in those years.

Return for Land and Management.

Although the value of the present trees is reduced as a result of an increase in yield anticipations for the replacement trees the return for land and management is increased. Assuming that the return for management is constant and that the capitalization rate is 6 percent the increase in the capitalized value of land exceeds the decrease in the value of the trees. This is what would be expected from an increase in the yields for the replacement trees. The price that the prospective purchaser could pay for the orchard would be higher.

yields increase from anticipation 2 for the present orchard to anticipation 4 for the replacement orchard (Table 9). In year 20 the reduction in the value of the present trees is only $115 per acre. The higher the yield anticipation for the replacement orchard the greater the reduction in the value of the present trees. For example, the reduction in the value of the trees is [illegible] per acre in year 15 when the yields increase from anticipation 2 for the present orchard to anticipation 4 for the following orchard (Table 9). However, the reduction in the value of the present trees is [illegible] per acre (for 10 years the trees in the yield anticipations are numbers 5 rather than numbers 4 for the replacement orchard). This is a result of the present trees being replaced at an earlier age because of the better alternative from the replacement trees. The ends of the years in which the present orchard should be replaced under various yield anticipations for the replacement trees are presented in Tables 9 and 10. When the age of the trees exceeds the replacement age in table the value of the trees is zero. Therefore, the reduction in the value of the trees in the years beyond the year that the present trees should have been replaced is such that the value of the trees is zero in these years.

<u>Returns for Land and Improvements</u>

Although the value of the present trees is reduced as a result of an increase in yield anticipations for the replacement trees the returns for land and improvements is increased. Assuming that the orchard's management is constant and that the capitalization rate is 6 percent the increase in the capitalized returns to land exceeds the decrease in the value of the trees. This increase would be [illegible] from an increase in the yields for the replacement trees. The price that the prospective purchaser could pay for the orchard would be higher.

The annual increases in the return for land and management resulting from the price conditions and the increases in yield anticipations assumed in Tables 9 and 10 were calculated. These are presented in Table 11. Using the above illustration of a change from yield anticipation 2 for the present trees to yield anticipation 4 for the replacement trees the return for land and management is increased by $54 per acre per year. If the return for management is assumed to remain constant and the capitalization rate is 6 percent the purchaser could pay $900 more for the land. Under the above assumptions, an increase in the yield anticipations from number 2 for the present trees to number 4 for the replacement trees would increase the value of the present orchard with 15 year old trees by $470 per acre. This is a result of the value of the 15 year old trees decreasing by $430 per acre and the return for land increasing by $900 per acre. This relationship for a number of yield anticipations and various ages of trees is presented in Figure 7. The return for management is assumed to remain constant at $60 per acre. Figure 7 demonstrates 2 relationships very well. The greater the increase in yield anticipations for the replacement orchard the lower the value that is placed upon the trees of the present orchard. Also the older the trees the lower the value that is placed upon the present trees.

The difference between the value of the trees and the return for land curve for yield anticipation 2 and the curves for the other yield anticipation is the maximum difference that the purchaser could pay for the land and trees using a capitalization rate of 6 percent. Actually, the illustration in one sense does not accurately reflect the difference that the orchardist would be willing to pay for a block of trees. This is because a yield anticipation similar to anticipation 2 does not result in any return for land if the return

The annual increases in the return for land and management resulting from the price conditions and the increases in yield anticipations assumed in Tables 9 and 10 were calculated. These are presented in Table 11. Using the curve (illustration) of a change from yield anticipation 2 for the present trees to yield anticipation 4 for the replacement trees the return for land and management is increased by $15 per acre per year. If the return for management is assumed to remain constant and the capitalization rate is 5 percent the purchaser could pay $300 more for the land. Under the above assumptions, an increase in the yield anticipations from number 2 for the present trees to number 4 for the replacement trees would increase the value of the present orchard with 15 year old trees by $470 per acre. This is a result of the value of the 15 year old trees decreasing by $400 per acre and the return for land increasing by $900 per acre. This relationship for a number of yield anticipations and various ages of trees is presented in Figure 7. The return for management is assumed to remain constant at $40 per acre. Figure 7 demonstrates the relationships very well. The effect of the increase in yield anticipation for the replacement orchard on land the value that is placed upon the trees of the present orchard. Also the older the trees the lower the value that is placed upon the present trees.

The difference between the value of the trees and the return for land under the yield anticipation 2 and the curves for the other yield anticipation is the amount of difference that the purchaser could pay for the land and trees using a capitalization rate of 5 percent. Actually, the illustration in since does not accurately reflect the difference that the purchaser would be willing to pay for a block of trees. This is because a yield anticipation similar to anticipation 2 does not result in any return for land if the return

TABLE 11

Increases in Return of Land and Management Resulting in an Increase in Yield Anticipations for the Replacement Block of Trees, Peaches at Various Prices[a/].

Yield anticipations	Increase in annual return for land and management	
	Price of peaches $60 per ton 15% green drop & 5% cannery diversion	Price of peaches $50 per ton no green drop or cannery diversion
	dollars per acre	
	1	2
Increase in yield anticipations from:		
Anticipation 1 to		
Anticipation 2	b/	31
Anticipation 3	b/	69
Anticipation 4	b/	85
Anticipation 5	b/	145
Anticipation 2 to		
Anticipation 3	34	38
Anticipation 4	48	54
Anticipation 5	103	114
Anticipation 3 to		
Anticipation 4	14	16
Anticipation 5	69	76
Anticipation 4 to		
Anticipation 5	55	60

a/ Calculated from Table 8.

b/ The returns for land and management were negative for yield anticipation 1, therefore, the change in returns was not calculated.

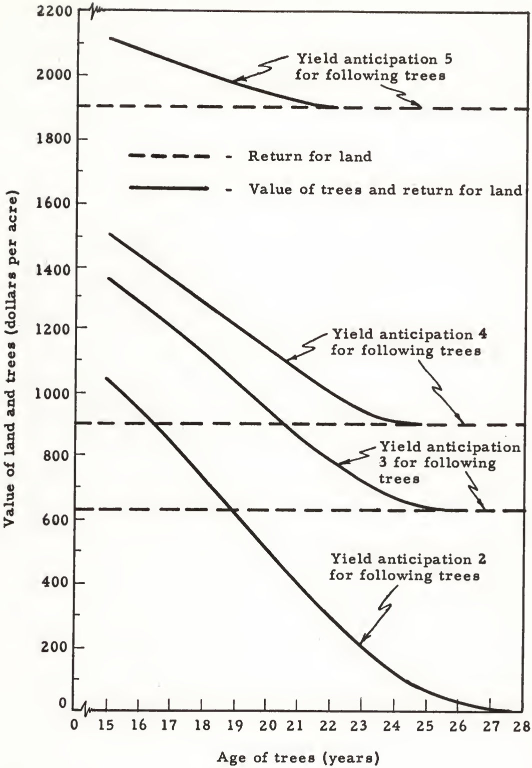

Figure 7. Value of Land and Trees Per Acre for Orchard with Present Yields Similar to Anticipations 2 but Yield for the Replacement Orchard Similar to Anticipations 2, 3, 4 or 5, Return for Management of 60.00 Dollars Per Acre and Land Capitalized at 6 Percent with the Price of Peaches of 55.00 Dollars Per Ton.

to management is $60 per acre. Thus it would be extremely unlikely that the orchardist desiring a $60 return per acre for management would purchase the orchard if the yield anticipations for the following trees were not at least as great as those of yield anticipation 4. Even with this yield anticipation the prospective purchaser could only pay $900 per acre for the land if his capitalization rate is 6 percent. For 20 year old trees he could pay another $350 per acre for the trees.

VII. THE EFFECTS OF A CHANGE IN COSTS

A change in the cost of production will affect the pricing of an orchard. However, different types of cost changes will affect the pricing of the orchard differently. The types of cost changes might be classified according to whether or not they affect yields. A change in the fixed costs is not expected to change yields while a change in costs due to the level which an input (e.g., fertilizer) is applied will be expected to change yields. An increase in the costs of an input may or may not affect the level of the yields depending on whether or not the quantity of the input applied is decreased.

Changes in Costs Not Affecting Yields

The first type of cost change to be considered is that of a change in the fixed costs of production. A change in the fixed costs, assuming that the per acre level of production is not affected, will change the return for land and management. It will have no effect upon the value of the trees. This has important implications when considering the aspects of economics associated with size of the orchard operation. The fixed costs on machinery and equipment

to management is and per acre. Thus it would be extremely unlikely that the [illegible] would generate the [illegible] [illegible] per acre [illegible].

VIII. THE EFFECTS OF CHANGES IN COSTS

A change in the cost of production will [illegible] factors, different types of cost [illegible]. The type of cost change [illegible] change in the first [illegible] to change [illegible] [illegible] costs of [illegible] [illegible].

<u>Changes in Fixed and Variable Costs</u>

The first type of cost change to be considered is [illegible] change in [illegible] fixed costs of production. A change in the fixed cost, [illegible] per acre level of production, is not associated with [illegible] and management. It will [illegible] important implications when considering the aspects of [illegible] with size of the [illegible] operation. [illegible]

alone amount to approximately $55 per acre annually on a 40 acre cling peach orchard.[1/] Many orchardists could increase the size of their present operation considerably with just a small increase in investment in equipment. The following assumptions have been made concerning the additional equipment required as an orchardist expands his orchard from 40 acres to 80 acres.

1. An investment of $42 is required for ladders, props, picking buckets and harness and pruning equipment for each additional acre of orchard acquired. The annual depreciation and the interest on investment are $5 per acre.
2. The orchardists will require an additional 1/2 ton pickup truck and a 4-pallet pallet wagon when the total acreage exceeds 50 acres. The depreciation and interest on the investment for these items are $316 per year.
3. An additional wheel tractor will be required when the total acreage exceeds 60 acres. The depreciation and interest on the investment for the tractor are calculated to be $390 per year.
4. A fourth pallet wagon will be needed when the total acreage exceeds 70 acres. The depreciation and the interest on investment are calculated to be $36 per year.

The above assumptions are summarized in Table 12. The average fixed cost curve is a "lumpy" or discontinuous curve because it is assumed that an orchardist must acquire additional equipment when the acreage exceeds a certain amount. For example, it is assumed that the present power is adequate until 60 acres is exceeded. When the total acreage is 60.1 acres then an additional

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1/ Faris, J. E., op. cit.

TABLE 12

Changes in Fixed Costs for Machinery and Equipment as Orchard Size is Increased From 40 Acres to 80 Acres[a]

Total acreage	Total fixed costs for machinery & equipment	Average fixed costs for machinery & equipment	Additional total fixed costs for machinery & equipment	Additional average fixed costs for machinery & equipment	Difference between average fixed costs for 40 acres & additional average fixed costs
1	2	3	4	5	6
40.0	2,180	54.50			
50.0	2,230	44.60	50	5.00	49.50
50.1	2,546	50.82	366	36.24	18.26
60.0	2,596	43.27	416	20.80	33.70
60.1	2,986	49.68	800	40.10	14.40
70.0	3,036	43.37	856	28.53	25.97
70.1	3,072	43.82	892	29.63	24.87
80.0	3,122	39.02	942	23.55	30.95

a/ Fixed costs include depreciation and interest on investment.

tractor must be purchased with results in a discontinuous average cost curve (see Figure 8). Although in actual practice the orchardist would not purchase an additional tractor for .1 of an acre he would have to determine the amount of additional equipment needed if he expanded his present orchard by 5 or 10 acres. However, if only 5 acre increments were considered the average cost curve would still be "lumpy." The average cost curves presented in Figure 8 can not be used to construct an economies of scale curve. This is because the operator would not, in most instances, have the same combination of equipment if he were selecting the "best" combination of equipment for an 80 acre cling peach orchard. These curves do indicate what might happen in the short run transition period as the orchardist added equipment to his original equipment component.

The average fixed cost on equipment for 80 acres is approximately $15 less than the average fixed cost for 40 acres of orchard. This $15 per acre would be a return for land and management. Although this may not appear to be very large it amounts to $1,200 on an 80 acre orchard.

The average fixed cost does not indicate the return for land and management that would be forthcoming from the additional acres purchased. If no larger pieces of equipment need to be purchased, as is assumed in this illustration when the average is increased from 40 acres to 50 acres, the return for land and management from the additional 10 acres is $49.50 per acre (see column 6, Table 12). This is the return that results from spreading the overhead. In addition the regular return to land and management which is a function of the price and yield anticipation will also be forthcoming. When an additional 40 acres are purchased the return for land and management is increased by approximately $31 per acre under the assumed conditions. It

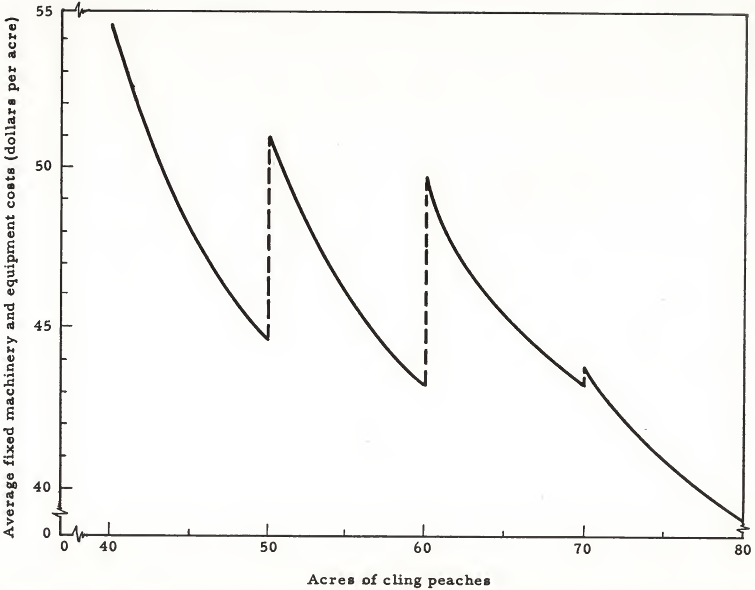

Figure 8. Average Fixed Costs for Machinery and Equipment as Additional Equipment is Added in Expanding an Orchard from 40 Acres to 80 Acres.

should be explicitly stated that these figures are just estimates. Undoubtedly the depreciation of some of the equipment will be higher than that indicated because of increased use. However, there may also be some economies in the purchase of inputs that will help offset the increase in the depreciation rate.

The implications of the above are two fold. First, it indicates that an orchardist who can expand his orchard operation without incurring a number of large investments in equipment can pay more for an orchard than can an individual that must purchase a whole complement of equipment. The second implication is that the larger orchardists are better able to withstand lower cling peach prices than are the smaller orchardists. Not only do they have a larger volume of fruit but the return for land and management is considerably higher per acre. Also if certain operations currently performed by hand labor become mechanized and if the investment in this equipment is quite large the orchardists with larger acreages would probably have considerably higher returns for land and management.

Changes in Costs Affecting Yields

The second type of change in the costs is one that would affect yields. Increased or decreased use of fertilizer or spray are examples of this type of change in costs. A change in the yield anticipations would result in the value of the trees and the return for land and management being changed. In this instance where additional capital in the form of inputs is applied and the yields increase the value or return for the use of other factors are also increased as long as marginal costs are less than marginal returns.

Changes in Costs that May or May Not Affect Yields

The third type of change in the costs is one that may or may not affect the yields. If the price of a factor increases the orchardist may or may not decrease the use of this input. In the event that the quantity of the input is decreased and the yields decrease the value of the trees and the return for land and management are decreased. In the event that the use of the input remains the same only the return for land and management is affected.1/

VIII. SUMMARY

A major problem confronting a number of cling peach orchardists is that of the price to pay for an orchard or additional acres of cling peach orchard. Five yield anticipation curves were constructed ranging from a maximum yield of 15.0 tons per acre to 22.0 tons per acre. A method was developed to determine the value of the trees by age and the return for land and management for the 5 yield anticipations. Three different price levels for peaches were assumed; \$50, \$55, and \$60 per ton.

The analysis indicated that the trees attained their maximum value when they were from 7 to 9 years of age. The effect of a price change on the value of the trees was quite significant. In the range of prices investigated a 10 percent change in price resulted in a 20 to 25 percent change in tree valuation. The effect of yields was also very important. Generally the value of the trees for the highest yield anticipation was more than 50 percent above the tree valuation of the lowest yield anticipation.

1/ This may have a small effect upon the value of the trees because the net revenue from mature trees may be decreased more than the net revenue from young trees. For example, the mature trees are fertilized at a heavier rate than young trees.

The return for land can not be separated from the return for management except in an arbitrary manner. It was assumed that the return for land and management was a constant amount each year throughout the life of the orchard. Although changes in yield anticipations and the price received for cling peaches had a very pronounced effect upon the value of the trees these changes had an even greater effect upon the return for land and management. Assuming that the return for management is some constant amount per year a $5 per ton change in the price received, on the average, changed the return for land by approximately $55 per acre. Capitalized at 6 percent this amounts to $900 per acre. Using the same assumptions for the return for management and the capitalization rate the difference between the capitalized value of land for the highest and lowest yield anticipation was approximately $2,400 per acre.

In many of the recent years the cling peach industry has been faced with a large production of peaches. Quantity reductions at the farm level have been accomplished by means of a "green drop" and at the cannery level by "cannery diversion." The effects on the value of the trees and the return for land and management were investigated for a 15 percent green drop and a 5 percent cannery diversion. The analysis indicated that the price of cling peaches would have to be $8 to $11 per ton higher under these quantity control measures than under no quantity control in order to have the same tree valuation and returns for land and management.

Two types of changes (increases) in yield anticipations were investigated. Increases in yield anticipations for the same orchard will increase the value of the trees and the return for management. The return for land will remain about the same. However, an increase in the anticipated yields of the replacement orchard over the present orchard will decrease the value of the present

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Two types of changes (increases) in yield anticipations were considered. Increases in yield anticipations for the same orchard will increase the value of the trees and the return for management. The return for land will remain about the same. However, an increase in the anticipated yields of the replacement orchard over the present orchard will decrease the value of the present

trees and increase the return for land and management. This is because it is profitable to replace the present orchard at an earlier age so the replacement orchard is a better alternative. This results in a smaller stream of income for the present trees.

An orchardist who can expand his orchard operation without increasing his investment in equipment proportionally can pay more for an orchard than can an individual that must purchase a whole complement of equipment. This "spreading of the overhead costs" is reflected in the return for land and management. The analysis also indicated that larger orchardists are better able to withstand lower cling peach prices than are the smaller orchardists. Not only do they have a larger volume of fruit but the return for land and management is, in many instances, considerably higher per acre.

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APPENDIX TABLE 1

Basic Annual Net Revenues by Age and Yield Anticipation, Peaches at 55 Dollars Per Ton.

Age of trees (years)	Dollars per acre net revenue for yield anticipation:				
	Number 1	Number 2	Number 3	Number 4	Number 5
1	2	3	4	5	6
0	-283.00	-283.00	-283.00	-283.00	-283.00
1	-138.83	-138.83	-138.83	-138.83	-183.83
2	-159.57	-159.57	-159.57	-159.57	-159.57
3	-127.43	-127.43	-127.43	-89.73	-89.73
4	-93.29	-30.81	-30.81	-9.99	-9.99
5	43.04	63.86	63.86	105.52	105.52
6	161.02	211.00	211.00	256.82	294.30
7	216.45	258.11	287.26	295.59	378.89
8	211.55	253.20	328.17	299.02	390.64
9	168.18	209.83	322.29	280.63	418.18
10	187.82	229.47	362.75	312.77	466.87
11	181.38	223.03	364.64	306.33	472.93
12	175.98	217.63	355.07	300.93	467.53
13	171.81	217.63	342.58	300.93	459.20
14	171.81	217.63	325.92	300.93	446.71
15	167.65	217.63	309.26	300.93	442.54
16	169.15	219.13	289.93	302.43	428.55
17	164.99	219.13	273.27	302.43	414.89
18	156.65	216.30	252.45	302.43	402.39
19	152.49	210.80	227.46	302.43	385.73
20	142.16	202.47	202.47	302.43	369.07
21	135.83	189.97	189.97	294.10	348.25
22	127.50	169.15	169.15	281.61	327.42
23	119.17	148.33	148.33	264.95	306.59
24	110.84	127.50	127.50	239.95	281.61
25	98.35	106.67	106.03	219.13	256.61
26	85.85	85.85	85.85	194.14	227.46
27	65.03	65.03	65.03	169.15	198.56
28	44.20	44.20	44.20	139.99	166.65
29	23.37	23.37	23.37	110.84	131.67
30	2.56	2.56	2.56	81.68	94.18

APPENDIX TABLE 2

Basic Annual Net Revenues by Age and Yield Anticipation,
Peaches at 50 Dollars Per Ton

Age of trees (years)	Dollars per acre net revenue for yield anticipation:				
	Number 1	Number 2	Number 3	Number 4	Number 5
1	2	3	4	5	6
0	-283.00	-283.00	-283.00	-283.00	-283.00
1	-138.83	-138.83	-138.83	-138.83	-138.83
2	-159.57	-159.57	-159.57	-159.57	-159.57
3	-132.43	-132.43	-132.43	-99.73	-99.73
4	113.29	-58.31	-58.31	-39.99	-39.99
5	3.04	21.36	21.36	58.02	58.02
6	87.02	141.00	141.00	181.32	214.30
7	143.95	180.61	206.26	213.59	286.89
8	136.55	173.20	239.17	213.52	294.14
9	98.18	129.83	228.79	192.13	313.08
10	112.82	149.47	266.75	222.77	358.37
11	176.38	143.03	267.64	216.33	362.93
12	170.98	137.63	258.57	210.93	351.53
13	97.31	137.63	247.58	210.93	350.20
14	97.31	137.63	232.92	210.93	339.21
15	93.65	137.63	218.26	210.93	335.54
16	95.15	139.13	201.43	212.43	326.05
17	91.49	139.13	186.77	212.43	311.39
18	84.15	135.47	168.45	212.43	300.39
19	80.49	131.80	146.46	212.43	285.73
20	71.16	124.47	124.47	212.43	271.07
21	65.83	113.47	113.47	205.10	252.75
22	58.50	95.15	95.15	194.11	234.42
23	51.17	76.83	76.83	179.45	216.09
24	43.84	58.50	58.50	152.45	194.11
25	32.85	40.17	40.17	139.13	172.11
26	21.85	21.85	21.85	117.14	146.46
27	3.53	3.53	3.53	95.15	120.81
28	-14.80	-14.80	-14.80	69.49	93.15
29	-33.13	-33.13	-33.13	43.84	62.17
30	-51.44	-51.44	-51.44	18.18	29.18

APPENDIX TABLE 3

Basic Annual Net Revenues by Age and Yield Anticipation, Peaches at 60 Dollars Per Ton

Age of trees (years)	Dollars per acre net revenue for yield anticipation:				
	Number 1	Number 2	Number 3	Number 4	Number 5
1	2	3	4	5	6
0	-283.00	-283.00	-283.00	-283.00	-283.00
1	-138.83	-138.83	-138.83	-138.83	-138.83
2	-159.57	-159.57	-159.57	-159.57	-159.57
3	-122.43	-122.43	-122.43	-79.73	-79.73
4	-73.29	-3.31	-3.31	20.01	20.01
5	83.04	106.36	106.36	153.02	153.02
6	225.02	281.00	281.00	332.32	374.30
7	288.95	335.61	368.26	377.59	470.89
8	286.55	333.20	417.17	384.52	487.14
9	243.18	289.83	415.79	369.13	523.08
10	262.82	309.47	458.75	402.77	575.37
11	256.38	303.03	461.64	396.33	612.93
12	250.98	297.63	451.57	390.93	577.53
13	246.31	297.63	437.58	390.93	568.20
14	246.31	297.63	418.92	390.93	554.21
15	241.65	297.63	400.26	390.93	549.54
16	243.15	299.13	378.43	392.43	537.05
17	238.49	299.13	369.77	392.43	518.39
18	229.15	294.47	336.45	392.43	504.39
19	224.49	289.80	308.46	392.43	485.73
20	215.16	280.47	280.47	392.43	467.07
21	205.83	266.47	266.47	383.10	443.75
22	196.50	243.15	243.15	369.11	420.42
23	187.17	219.83	219.83	350.45	397.09
24	177.84	196.50	196.50	322.45	369.11
25	163.85	173.17	173.17	299.13	341.11
26	149.85	149.85	149.85	271.14	308.46
27	126.53	126.53	126.53	243.15	275.81
28	103.20	103.20	103.20	210.49	240.15
29	79.87	79.87	79.87	177.84	201.17
30	56.56	56.56	56.56	145.18	159.18

APPENDIX TABLE 4

Value of Trees Per Acre by Yield Anticipation and for Three Prices for Peaches

Orchard purchased at beginning of year	Yield Anticipations													
	Number 1 Price per ton a/		Number 2 Price per ton			Number 3 Price per ton			Number 4 Price per ton			Number 5 Price per ton		
	$55	$60	$50	$55	$60	$50	$55	$60	$50	$55	$60	$50	$55	$60
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	285	285	285	285	285	265	285	285	285	285	285	285	285	285
2	485	540	465	520	565	495	560	605	505	580	625	555	630	700
3	730	840	685	800	905	755	885	990	780	925	1,030	890	1,040	1,185
4	970	1,135	910	1,080	1,240	1,015	1,210	1,385	1,030	1,235	1,405	1,205	1,425	1,645
5	1,205	1,415	1,080	1,295	1,500	1,230	1,480	1,700	1,240	1,500	1,715	1,495	1,775	2,055
6	1,325	1,565	1,190	1,435	1,670	1,390	1,680	1,940	1,380	1,660	1,930	1,715	2,040	2,375
7	1,340	1,590	1,185	1,440	1,685	1,445	1,750	2,030	1,405	1,695	1,980	1,800	2,150	2,505
8	1,295	1,545	1,140	1,395	1,640	1,435	1,750	2,035	1,400	1,695	1,985	1,825	2,175	2,545
9	1,245	1,495	1,090	1,345	1,590	1,400	1,700	1,980	1,385	1,685	1,980	1,825	2,185	2,560
10	1,230	1,470	1,080	1,330	1,565	1,355	1,645	1,920	1,385	1,685	1,975	1,805	1,160	2,540
11	1,185	1,425	1,040	1,285	1,515	1,260	1,540	1,800	1,355	1,645	1,935	1,735	2,080	2,450
12	1,140	1,370	995	1,235	1,460	1,150	1,410	1,655	1,315	1,605	1,890	1,640	1,970	2,305
13	1,090	1,315	950	1,180	1,400	1,030	1,270	1,495	1,275	1,555	1,835	1,535	1,850	2,165
14	1,030	1,245	895	1,115	1,325	900	1,120	1,325	1,225	1,495	1,765	1,420	1,715	2,015
15	960	1,170	830	1,040	1,240	770	960	1,145	1,165	1,425	1,685	1,295	1,570	1,850
16	880	1,080	755	950	1,140	640	810	970	1,095	1,335	1,595	1,155	1,405	1,665
17	795	980	670	850	1,020	520	665	805	1,005	1,235	1,470	1,010	1,235	1,465
18	705	875	580	740	895	410	530	645	910	1,120	1,335	870	1,070	1,275
19	620	775	490	630	765	305	405	500	810	1,000	1,195	730	905	1,090
20	535	670	395	515	630	220	300	380	700	870	1,045	600	745	905
21	455	570	305	405	500	155	180	275	585	735	885	475	595	735
22	375	475	215	300	380	90	135	180	475	600	725	360	460	575
23	300	385	145	205	270	45	75	100	365	465	575	255	335	430
24	225	295	85	130	175	15	30	40	260	345	430	165	220	300
25	160	215	40	70	105				175	240	300	90	125	185
26	100	135	10	30	50				105	145	190	35	50	95
27	50	70		5	15				50	75	105			
28	15	25							15	25	35			

a/ The return to land and management when the price for peaches is $50 per ton is less than zero.

APPENDIX TABLE 5

Value of Trees Per Acre by Yield Anticipation With a 15 Percent Green Drop and 5 Percent Cannery Diversion, Price of Peaches at 55 and 60 Dollars Per Ton

Orchard purchased at beginning of year	Yield Anticipations						
	Number 2 Price per ton[a/]	Number 3 Price per ton		Number 4 Price per ton		Number 5 Price per ton	
	$60	$55	$60	$55	$60	$55	$60
1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0
1	285	285	285	285	285	285	285
2	480	465	515	480	520	520	580
3	710	685	785	715	805	810	925
4	945	910	1,060	920	1,065	1,075	1,230
5	1,120	1,100	1,290	1,100	1,285	1,325	1,530
6	1,235	1,235	1,455	1,215	1,430	1,515	1,755
7	1,240	1,285	1,515	1,235	1,460	1,585	1,850
8	1,195	1,260	1,510	1,225	1,455	1,600	1,865
9	1,145	1,215	1,465	1,215	1,445	1,605	1,875
10	1,135	1,175	1,420	1,215	1,445	1,585	1,855
11	1,090	1,090	1,320	1,185	1,410	1,520	1,785
12	1,050	990	1,205	1,150	1,375	1,435	1,690
13	1,000	888	1,085	1,115	1,335	1,345	1,585
14	945	765	950	1,070	1,280	1,240	1,465
15	880	650	815	1,015	1,220	1,130	1,340
16	800	535	680	950	1,145	1,005	1,195
17	710	430	555	870	1,055	875	1,050
18	620	335	440	785	955	750	905
19	520	245	335	695	850	630	760
20	425	175	245	600	740	515	625
21	330	115	170	500	620	405	495
22	240	65	105	400	505	305	380
23	160	30	55	305	390	215	270
24	100	5	20	215	285	135	175
25	50			145	195	75	100
26	15			80	120	25	40
27				35	60		
28				5	20		

a/ The return to land and management when the price for peaches is $50 per ton is less than zero.